# PRE-CAMBRIAN NOMENCLATURE

A. P. COLEMAN
University of Toronto

The report of the committee of American and Canadian geologists appointed by the surveys of the two countries to compare notes in the field and decide upon a suitable nomenclature for the pre-Cambrian formations of the Upper Lakes, forms an important landmark in the geology of that region. While it is evident from the report itself that the results attained represent a compromise, not perhaps altogether satisfactory to either party, in the long controversy which has been waged over the relationship of these complex and difficult formations, yet it is to be hoped that, at least in its broad lines, the proposed nomenclature will be accepted by future workers in the region, putting an end to the confusion which has reigned. The position and reputation of the members of the committee give their decisions great weight, and doubtless their nomenclature is the best that could be framed to reconcile the two points of view.

Accepting it as such it may still not be amiss to discuss certain features of the report, as they appear to one who has worked over much of the region on the Canadian side.

The brief summing up of the results of their field-work in the various districts visited is of use as showing the ground covered by the committee, and the materials which they brought to bear on the solution of the problems of the pre-Cambrian; and in general their conclusions seem quite justified, in spite of the short time which could be devoted to any one place. Several members of the committee had of course previously done a large amount of work in the critical localities and were thoroughly familiar with the field relationships. It is to be regretted, however, that so few of the characteristic sections of the Rainy Lake region were visited, and that the important Michipicoten district was not visited at all. In the latter case Professors Van Hise and Leith had, however, acquired some first-hand knowledge of the field relations.

The locality visited for a study of the Rainy Lake Couchiching was, however, decidedly unfortunate, since characteristic Couchiching is not displayed at Shoal Lake.

It must be remembered that Lawson's admirable work in the region was devoted to mapping the rocks on a lithological basis, since the time relationships were obscure. Finding a series of sediments distinct from the prevailingly eruptive or pyroclastic rocks which he had previously studied on the Lake-of-the-Woods, he gave them the name Couchiching, and mapped all the sedimentary gneisses and schists under the same color. He considered the Couchiching to be lower than the Keewatin, and in general he was correct in this; but the significance of the conglomerates occurring in various parts of the region was evidently not clear to him. The mica schists which overlie the basal conglomerate at Shoal Lake should really be excluded from the Couchiching, on account of their much later age, though lithologically very like the typical rocks. The greater part of the rocks mapped as Couchiching lie far below the conglomerate, often at the base of the series of schists, through which, as Lawson proved, the granite and gneiss have pushed eruptively, though similar bands occur at higher levels among the Keewatin ash rocks and volcanics. The later schists above the conglomerate clearly belong to the Huronian and not to the Keewatin.

If the committee had examined the region about Rice Bay, a few miles west of Shoal Lake, they would have found a thick series of Couchiching schists and gneisses associated with banded silica and graphitic slate of the iron formation, undoubtedly more ancient than the Shoal Lake conglomerate since the latter incloses many pebbles of the same banded rocks. Similar associations occur at Fair's farm, about two miles west of Fort Frances, where the iron formation is intimately connected with typical Couchiching. A still better example of the same relation is found at various places to the north; for instance, along the Canadian Pacific Railway near Dryden, where an iron range has been traced for several miles, everywhere parallel to and interfolded with characteristic Couchiching schists.

In the American pre-Cambrian regions south of Lake Superior the amount of sedimentary material associated with the Keewatin pyroclastics and eruptives is insignificant, so that, not unnaturally,

the basement complex is looked on by American geologists as overwhelmingly eruptive in origin. This is by no means the case, however, in the Rainy Lake and Wabigoon regions of Ontario, where in some places the Couchiching sediments cover many square miles and are thousands of feet thick.

Logically the basal formation should be called the Couchiching, since our time subdivisions in all later formations are founded on sedimentary rocks, the eruptives being looked on as, in a sense, accidental. Still we may follow the committee in using the pleasant-sounding name Keewatin, which was given first and has been widely used by other writers since Lawson introduced it, in place of the uneuphonious Couchiching.

Turning to another point, the suggestion of the committee that the name Laurentian should preferably be confined to granite and gneiss older than the lower Huronian will not commend itself to many Canadian geologists. As shown by Professor Willmott and the present writer in the Michipicoten and other districts of northern Ontario, this would cut out the majority of the areas of gneiss and granite named and mapped by Logan and his successors as Laurentian. As they are in some cases the actual rocks which received the name from Logan, and as they occupy an enormously greater area than the similar rocks in the United States, one fails to see why the recognition of the later age of most of these granites and gneisses should be so grudgingly allowed. Why should it be permissible only "in certain cases" and "preferably with an explanatory phrase" to call these rocks Laurentian? Should not the usual relationship be accepted as typical, and the explanation be applied to the older granites and gneisses found in the comparatively insignificant basal complex south of the Great Lakes?

This question of the relative age of the Laurentian and the basal sedimentary rocks is evidently rising in other quarters also, as may be seen from Professor Keyes's article on "The Fundamental Complex of the Southern End of the Rocky Mountains,"[1] where he evidently looks on all sedimentary rocks as necessarily later than the Laurentian or Archaean. Now that it has been proved that water-formed sediments, sometimes in large amounts, belong to the basal complex and

[1] *American Geologist*, Vol. XXXVI, No. 2, p. 116.

are older than the Laurentian eruptives in the Great Lakes region, where these rocks have been most widely studied, should not the western geologists revise their point of view and drop either the "Proterozoic" or the "Azoic," or both, from their nomenclature?

A third point in the report requires comment, viz., the separation of the Keweenawan from the Huronian as an upper pre-Cambrian formation. The break between the Keweenawan and the Animikie is certainly not more important than that between the Animikie and the next lower formation, the Middle Huronian of the new classification, Logan's Upper Huronian. If the Animikie, which was not included by Logan in the Huronian, is now placed within it, why not close up the gap and include the Keweenawan also as a provisional fourth division of the Huronian? Probably most geologists who have studied the Keweenawan would be inclined to place it with the Cambrian, and some have suggested that the Animikie also is early Cambrian. Certainly the two formations should go together.

Since the Huronian as mapped by Logan and Murray included some areas now called Keewatin, the new definition has shifted the use of the term upward, omitting part of the lower rocks, but adding the Animikie above. Logan intended that the Huronian of the upper Lakes should include all the rocks between the base of the Cambrian and the Laurentian, since he suggests that the two divisions of the upper copper-bearing rocks (now known as the Animikie and the Keeweenawan) are probably equivalent to the Potsdam and the Chazy.[2]

If the Huronian is defined as including all between the Cambrian and the Keewatin, the term "Algonkian" becomes unnecessary and should be dropped, at least in the Lake Superior region. Possibly its use might be continued in the west, where the equivalence of the pre-Cambrian beds with those of the east is not certainly proved, but the law of priority should undoubtedly reinstate the name Huronian in the east. However, the term Algonkian is carefully omitted from the committee's report, perhaps in order not to raise a fresh subject for controversy. It may be taken for granted, I suppose, that Canadian geologists will continue to use the name Huronian instead of Algonkian; and it is to be hoped that if American geologists prefer to retain

[2] *Geology of Canada*, 1863, p. 86.

in the future the term Algonkian, now so widely in use in their literature, they will explain that in the Lake Superior region it is equivalence to Huronian.

In conclusion, it should be made clear that the writer has no desire to criticise captiously the conclusions arrived at by the committee, but merely wishes that all points should be thoroughly considered before we are finally committed to a nomenclature which presents some marked differences from the one usual in Canada. Perhaps the American members of the committee have conceded to the Canadians as much as could be expected when one considers what an important and powerful organization they represent—the greatest, and in the main the most ably manned, survey in the world.

The committee are certainly to be congratulated on reaching conclusions with which all geologists working in the region can agree, so far as the broad lines are concerned at least—a result which seemed very distant only a few years ago. Their report should do much to aid in the settlement of difficulties in pre-Cambrian geology in other parts of the world, as well as in the region of the Great Lakes.